

Preventing Musculoskeletal Disorders in Construction Workers

Types of Injuries

Most injuries in construction workers are sprains and strains of the muscles. Construction work can also cause injuries to the joints, bones, and nerves. These injuries often occur from constant wear and tear on the body. Taken together these injuries are called musculoskeletal disorders. Generally, musculoskeletal disorders in construction workers affect the hand and wrist, the shoulders, neck and upper back, the low back, and the hips and knees.

There are a number of well-known diagnoses of musculoskeletal disorders. They include:

- **Carpal Tunnel Syndrome**, a problem of the nerve in the hand and wrist, caused by repeated bending of the wrist, holding tools or materials tightly, constantly pressing the wrist against a hard object. Classic symptoms include: numbness, tingling, burning and pain. In severe cases, there may be wasting of the muscles at the base of the thumb; dry shiny palm; clumsiness of the hand.
- **Raynaud's Syndrome or White Finger Disease**, a problem of the nerves and blood vessels in the hands often caused by use of vibrating hand tools. Workers have numbness and tingling of the fingers, often brought on by cold weather. Fingers turn pale white, then blue and then red. Numbness and weakness prevent a good grip and interfere with the ability to work. Smoking can aggravate this condition by decreasing oxygen available to the fingers.
- **Tendinitis**, an inflammation and soreness in tendons, caused by repeated movement of a joint. Depending on where the injury occurs, a different name is assigned to the disease. Common tendinitis problems include : Tenosynovitis (usually in the wrist), Trigger finger (palm side of any finger other than the thumb), De Quervain's Disease (tendons in the thumb), Epicondylitis (tennis elbow). Symptoms include a burning pain or dull ache, swelling or puffiness, snapping or jerking movements (crepitus), Ganglionic cysts (a thick mucuous fluid which can form within a tendon sheath). Tendonitis is associated with work that requires repetitive motions like using a staple gun (asbestos abatement workers), rotating or twisting motions (screw driving). Tools that are too small or too large for the hand can also put stress on the tendons.
- **Thoracic Outlet Syndrome**, a problem caused by reduced blood flow in the shoulder and arm caused by overhead work or carrying heavy items in the hands with the arms straight down.
- **Carpet Layers' Knee**, caused by repeated use of a knee kickers while laying carpeting
- **Back Pain**, caused by repeated lifting of materials, by sudden movements, whole body vibration, lifting and twisting at the same time, bending over for long periods of time. Back problems, which seem to appear

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1 overnight, may have been building up slowly over a period of time.

2 **•Degenerative disc disease** is caused by damage to the gel-like cushions between
3 the spinal vertebrae or bones. Released gel presses on the nerve. Symptoms of
4 this disorder include numbness, pain and weakness, usually in the leg and hips,
5 but sometimes in the arms and upper back.

6
7 Of course there are many other types of musculoskeletal injuries and problems, including strains
8 and sprains, muscle and joint pains, broken bones, etc., which may be related to work on the
9 construction site. **A sprain is an injury or tear to a ligament.** Ligaments attach one vertebrae
10 to another and help support the spine. **Strains is an injury to muscles** that have been stretched
11 or used too much. Strained muscles and sprained ligaments both irritate the muscles around
12 them. This adds to the pain and discomfort.

Risk Factors for Musculoskeletal Disorders

Different types of construction work are often associated with different types injuries. For example, workers who do overhead work, such as painters and sheet metal workers, tend to have many more shoulder and neck problems. Trades at the highest risk of shoulder problems include: scaffold erectors, insulators and painters. Workers who work at floor level and kneel while working, like floor layers and roofers, sheet metal workers and insulators have many more knee problems. Other trades which kneel a lot and have a higher risk of knee injuries include roofers and carpenters. Carpenters and other trades that require constant use of hand tools, have more hand and wrist problems. Tendinitis in construction workers is most common among roofers and sheet metal workers and masons. It is also well known among rodmen who twist wire ties have ganglionic cysts (often called bible bumps) on their wrists. Raynaud's Syndrome is common among workers like lumberjacks, jack hammer users and others that use vibrating hand tools. Carpal tunnel syndrome has been reported in carpenters, electricians and sheet metal workers. Working as a laborer or scaffold erector where heavy lifting and carrying is common, is associated with back problems. Each of these types of work expose the construction worker to a different type of risk factor. Risk Factors are activities, actions, conditions or exposures that can increase your chance (risk) of developing a musculoskeletal disorder. There are some differences in the risk factors that are associated with musculoskeletal disorders of the hands, wrist, neck and shoulder also known as the upper extremities, the back, and the hips, knees, ankles and feet or the lower extremities.

Risk Factors for Hands, Wrist, Neck and Shoulders

Risk factors for musculoskeletal disorders of the hands, wrist, neck and shoulder may include:

1. Forcefulness or muscle effort.
2. Awkward body posture.
3. Repetitive work.
4. Vibration from hand tools.
5. External contact stress from tools and sharp objects.

Each of these risk factors is discussed in detail below.

1. Forcefulness or Muscle Effort

Force is the amount of effort it takes to do an activity or work. Pushing, pulling, gripping a tool are examples of activities that require you to exert force or muscle effort. Keeping your body in one position for a period of time (for example, doing overhead work) also requires muscle effort. **The more force you have to exert, the greater the stress on your body.**

The type of grip you use also makes a difference in the amount of effort you have to use. A **pinch grip** which uses only the fingers to hold an item, requires more muscle effort than a power grip. A **power grip** (full-hand grip), which uses the larger muscles of your arm, has about four times the strength of a pinch grip. A pinch grip can cause fatigue and injury.

The **position** of your hands and arms in relation to your body will also affect the amount of force you need to exert. If your wrists are bent downward, backward, or to one side or the other you will need to use more force to do your work. The more time you spend with your wrists bent while working and exerting muscle effort, the greater your risk of developing a musculoskeletal disorder.

A **slippery handle** or a handle with a small diameter is hard to hold, so you tend to grip it more tightly (apply more force). When your hands and fingers are cold, you grip tools more tightly to control them.

Gloves which are too tight or too loose or made of certain materials (some chemical-resistant gloves) make you grip tools more tightly. However, it is important to remember that gloves are an important part of Personal Protective Equipment (PPE) and should be worn when required.

2. Awkward Body Postures

Think about the most comfortable working posture for your neck, shoulders, arms, wrists and hands. Your shoulders are down and relaxed, your arms are close to your sides, elbows bent and wrists and hand straight, almost as if you were going to shake hands with someone. This is called a neutral posture. When your working posture is out of the neutral position, the stress on your joints, muscles, tendons, nerves and blood vessels is increased.. **The amount of muscle effort is also increased and your risk of fatigue and injury also increases.** It takes more muscle effort to work at eye height than to work at elbow height. Working with your arms raised is a very awkward posture which puts stress on the muscles, tendons and joints of your arms,

hands and shoulders. Working at elbow height also allows you to use your body weight to push the tool being used.

3. Repetitive Work

Nailing a deck and screwing drywall are examples of repetitive tasks. Doing the same motions over and over again puts stress on muscles, tendons and joints.

4. Vibration from Hand Tools

Damage to the blood vessels and nerves in your hand and fingers can result from the long term use of powered hand tools. Rotary hammers, chainsaws, grinders and jackhammers all cause vibrations to travel through the hand. The risk of conditions, such as Raynaud's Syndrome, from powered hand tools is increased if you are also exposed to cold, because the cold causes you to use a much tighter grip on the tool.

5. Contact Stress (Tools and Sharp Objects)

Tools and materials (wood, metal) can press against the soft part of the palm of your hand or other soft tissues of your body. When tools or sharp edges press into the palm of your hand, they can press on or compress the soft blood vessels and nerves in your hand. When blood vessels are compressed, the amount of blood that gets through to the tissues is reduced. Compressed nerves can cause numbness and tingling. Continuous compression may cause irreversible damage to the blood vessels, nerves and surrounding tissue.

Risk Factors for Back Injuries and Pain

There are a number of common risk factors associated with injuries to the back. They include:

1. Lifting
2. Pushing, pulling, tugging
3. Twisting, reaching, sideways bending, unequal lifting
4. Working in a single position
5. Whole body vibration

1. Lifting

Lifting is a forceful movement requiring energy and muscle effort. It stresses muscles, tendons

and ligaments and increases forces on your spine. This is true even if you use proper lift techniques. If you bend from the waist and lift at the same time, the forces on your spine are increased even more. This is also true if you reach, twist or hold the object away from your body as you lift. Using one arm to lift an object or carrying an object on one shoulder or one hip also places extra (and uneven) stress on the spine. Factors that affect the stress of a lift on the back and other parts of the body include:

- **Size and weight of the object.** If the object is **too big or bulky** you won't be able to do a squat lift (bent legs, straight back). If you have to bend from the waist to lift an object, the stress on your lower back is three times greater than if you lift with a straight back.
- **Horizontal distance of the lift.** If you hold the object **away from your body**, with your arms out in front of you, your back muscles have to work much harder to hold the object. When the object is held away from your body, the forces on your lower back increase. Lifting with the load away from your body also puts stress on your arms and shoulders.
- **Vertical distance of the lift.** Try to keep the **vertical distance** of lifts between knuckle and shoulder height. The lift should not start below knuckle height nor end above shoulder height. Lifting from below knuckle height puts stress on the legs and knees as well as on the back. Lifting above shoulder height puts stress on the upper back, shoulders and arms.
- **Twisting or bending done at the same time as the lift.** Bending or twisting while lifting greatly increases the stresses on the spine over a straight lift.
- **Amount of lifting.** Repeated lifting, even lift light loads may cause localized muscle fatigue or whole body fatigue. Fatigue increases the risk of accident and injury. Frequent lifting also puts stress on the discs, tendons and ligaments of the back.

2. Pushing, pulling, tugging and sliding

- Pushing, pulling, tugging and sliding objects require muscle force or effort. They put a strain on your lower back. They also stress the muscles, tendons and joints of your shoulders, arms, upper back and legs. The amount of force these movements require depends upon: The amount of force you use to pull or push the object. Pushing uses *less* force and allows you to use your own upper body weight.
- Body posture while pushing or pulling.

1 If you are in an awkward posture you will have to exert more force to move the object.

- 2
- 3 • Condition of the walking surface.

4 High friction between the object and the surface, for example over gravel, causes you to
5 exert more force or push harder to move the object. Slippery surfaces reduce the amount
6 of traction, leading to the possibility of slips and falls.

- 7 • Slope of the work surface

8 The greater the slope the harder it is to push the item.

- 9 • Weight of the object
- 10 • Position of the object.

11 Pushing or pulling an object that is above your shoulder or below your waist is more
12 stressful.

13

14

15 **3. Twisting, Reaching, Sideways Bending, Unequal Lifting**

16 Any amount of twisting, reaching or bending while lifting causes more stress on the back.

- 17 • **Reaching upward** usually causes you to arch your back. This increases the forces on the lower spine. It also
18 puts stress on the upper back, shoulders and arms.
- 19 • **Forward reaches** that are longer than the length of your arm and require you to bend or stretch put stress on
20 your lower back and on your legs.
- 21 • **Bending sideways** or twisting your trunk puts stress on your lower back.
- 22 • **Carrying an object on one shoulder, arm, hand or hip** puts more stress on one side of the spine.

23 **Remember:** The more reaching, twisting, sideways bending and unequal lifting/carrying you do,
24 the greater your risk of back injury.

25

26 **4. Working in a Single Position (static postures)**

27 Working in one position for an extended period of time causes muscle fatigue. Bending over,
28 leaning forward, and/or working with arms above shoulder height for a period of time stresses
29 the lower back, neck and shoulders. Even sitting for long periods causes back fatigue.

30

31 If you have already have low back pain, constant standing can be painful. Putting inserts in your
32 boots and standing on padding rather than hard ground or concrete may help. It's important to
33 move around, change positions and rest your muscles as often as possible

5. Whole Body Vibration

Whole body vibration is mainly a problem for heavy equipment operators and truck drivers. Over time, certain types of vibration can cause little changes (cumulative traumas) in the spine that can build up until there is permanent damage.

Other Risk Factors to Consider

Other risk factors contribute to the development of musculoskeletal disorders on the site. The include:

1. Floor surfaces and obstacles in the work area & House keeping Practices
2. Height of the work
3. Working beyond your capacity
4. Lifting techniques
5. Tool belts
6. Temperature

1. Floor surfaces and obstacles in the work area & House keeping Practices

Good housekeeping practices are important to reducing musculoskeletal disorders

- Mud, wet, oily surfaces and poor housekeeping are serious slip, trip and fall hazards.
- Materials, wires, power cords and tools on the ground are common causes of slips and trips. Slips and trips cause back injury.
- Reaching over, under or around an object or barrier increases the stresses on the lower back..

2. Height of the work

Work areas not designed so that both tall and short people can work comfortably are a problem for each:

- Tall people may need to bend over to stoop to do certain jobs. This increases the stress on their lower spines and tires their muscles.
- Shorter people may need to reach up to do a job. Bending backwards while reaching up, increases the pressure on the lower spines. Working with raised arms can also cause fatigue and shoulder, neck and elbow problems.

3. Working beyond your capacity

Being physically fit has many advantages **but strong muscles and fitness do not necessarily protect the spine from injury. Lifting affects spinal discs no matter how fit or strong you**

1 **are.**

2
3 It is important to remember that everyone has limitations. Working beyond our limitations puts
4 all workers at risk for injury.

5 6 **4. Lifting techniques**

7 Lifting involves many different muscle groups. Lifting from the ground to waist level uses
8 muscles of the leg and thigh. Lifting between the waist and the shoulder, uses mostly back
9 muscles. Lifting above shoulder height uses muscles of the upper back and shoulder.

10 Most of us have been taught that the proper lift technique is the squat lift with the knees bent and
11 back straight. A squat lift puts stress on the lower leg, knees and thighs. It also requires a lot of
12 energy.

13
14 The proper lift depends more on the **size and shape of the object** you are lifting than of any set
15 technique. If an object is too **big or bulky** you may not be able to hold it against your body as
16 you lift. When you hold an object away from your body, the forces on your spine increases.
17 This happens no matter what lift technique you use.

18
19 People who do a lot of lifting will often lift freestyle rather than squat. Freestyle (what most of
20 do when no one is watching back bent, legs almost straight) puts more stress on the back but
21 requires less energy than squat lifting.

22
23 It is important to be careful about the way you lift. No matter how you lift, **if the object is too**
24 **heavy**, back injury may occur. **The best way to prevent back problems is to eliminate or**
25 **reduce the need for heavy lifting.**

26 27 **5. Tool Belts**

28 Wearing a tool belt which can weigh anywhere from 25 to 60 pounds puts stress on the lower
29 back and hips. Adding suspenders to your tool belt can help redistribute the weight, but it
30 requires adjustment until you get the shoulder-waist-hip distribution that's best for you.
31 Suspenders can also cause shoulder discomfort. The best strategy is to reduce the weight of your
32 tool belt. If you don't need it, don't carry it.

33 34 **6. Temperature**

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Cold can increase the risk of muscle strain. Muscles tend to tense muscles when it is cold; this makes strain more likely. **(Note: Add the OSHA Cold Stress card as an appendix or the URL if on the Web Site)**

Heat Stress is a concern when working in hot or humid environments. Heavy physical work raises your body temperature. Heavy work in hot environments can lead to a series of problems including dehydration, heat cramps, confusion, heat exhaustion and heat stroke, which is life threatening. (Note: Add the OSHA Heat Stress card as an appendix or the URL if on the Web Site)

Non-Work-Related Risk Factors for Musculoskeletal Disorders

Some risk factors for musculoskeletal disorders have nothing to do with work. Certain medical conditions such as rheumatoid arthritis, diabetes, hormone imbalances and pregnancy can increase your chances of getting some musculoskeletal disorders. Your general health and age as well as spare-time activities may also play a part in the development of musculoskeletal disorders. If you work for yourself or on your own house in the evening and weekends, chances are you are being exposed to some of the same risk factors you face on your job. Even if your free time activities are very different from your work activities they may involve similar risk factors, such as repetitive actions, mechanical stress or awkward postures. If, for example, you're a pitcher during softball season, play a lot of tennis, or have hobbies which involve fine precision work (carving, model-making) you may be exposed to risk factors of musculoskeletal disorders. .

Remember that the greater the number of risk factors you are exposed to, the higher your risk of developing musculoskeletal disorders. The longer your exposure, the higher your risk.

Making Construction Work Safer

In most cases, the cause of musculoskeletal disorders can be traced to body movements and the demands of the job. Given the physical nature of construction jobs, it is not surprising that many complain of back, shoulder, or knee problems. Many of these conditions could be prevented if we reduce the amount of awkward, heavy, repetitive activities required by the job. While construction jobs will never be like desk jobs (and who would want that anyway?), they can be made to be safer.

Elements of a Good Health and Safety Program

Successful programs aimed at reducing musculoskeletal disorders have six essential elements. Your program may include more elements. The six essential elements include:

- Management commitment and employee participation.
- Hazard awareness and identification.
- Job hazard analysis and solution development.
- Training.
- Medical management and alternative duty.
- Program evaluation.

Management Leadership and Employee Participation

Management commitment to control and reduce work-related musculoskeletal disorders starts at the top and must run through every level in the organization. The commitment includes assigning program responsibilities and the authority to those that run the program, providing adequate financial, personnel and material resources, analysis of the worksite activities and infrastructure to identify risk factors and hazards, information dissemination, training and medical management.

The most effective solution to reducing safety and health hazards on the construction site is a combination of leadership and worker involvement. Involved employees provide input and report the presence of risk factors on the site, report symptoms and injuries, suggest and design solutions and provide the central resource for maintaining a risk free project. If there is a functioning safety committee on your project, control and prevention of musculoskeletal disorders should be one of its areas of concern. If there is no committee, consider forming one to address musculoskeletal disorders and other safety and health concerns on your project..

Hazard Awareness and Identification

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1 Superintendents, foremen and workers must be aware of risk factors and hazards on their jobs
2 and in their work environment that lead to musculoskeletal disorders. A key component of a
3 successful program is the ability of the workforce to learn, identify and report the risk factors,
4 hazards, signs and symptoms of musculoskeletal disorders. Skills in hazard awareness are
5 developed through training programs and hands-on practice. There are many programs and free
6 materials available in print and on the web that can help in this training. Information on where to
7 get some of this information is included in the back of this manual.

8 9 **Job Hazard Analysis and Solution Development**

10 A Job Hazard Analysis helps find what risk factors or hazards exist on the job site. Careful
11 evaluation of the job site identifies risk factors and hazards; use of checklists help record your
12 observations for further examination. Several check lists for recording risk factor and hazards
13 are included in this manual. Once the risk factors, hazards and injuries are identified and
14 recorded, the safety and health committee, in collaboration with management, contractors and
15 workers, have the facts to develop solutions, e.g., improve site housekeeping through the
16 alteration of material delivery schedule, use self-raising platforms or buddy system for lifting,
17 etc. Some general solutions are listed below.

18 **Training**

19 Training provides the basis for consistent awareness, identification, analysis, targeting and
20 control of musculoskeletal disorders hazards. The training should reach workers, foremen, and
21 superintendents as well as others participating in the musculoskeletal disorders control program
22 at no cost to them.

23 24 **Medical Management and Alternate Duty**

25 The key to rapid successful return to health, duty and productivity is prompt access to health care
26 for assessment, treatment and follow-up. The longer a worker is away from work the less likely
27 the worker will return. Replacement of a skilled workers is expensive or, at times, difficult to
28 impossible. It is a benefit to workers and employers to bring an injured worker back to alternate
29 or reassigned duties as soon as medically appropriate.

30 31 **Program Evaluation**

32 Evaluating the effectiveness of a program is just as important as instituting the program. Is your
33 program reducing musculoskeletal disorders, hazards and risks? Does an initial upsurge in
34 musculoskeletal disorders reporting mean your project became less safe because of the program?

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1 Does this upsurge mean that a hidden population of injured workers has gotten treatment and
2 will be returned to a healthier level of life and productivity? Have you successfully identified
3 and targeted your musculoskeletal disorders hazards? Program evaluation will help answer all
4 these and more questions.

5 **Where to find more information**

6 Add websites and publications for individuals to find information on reducing MSDs
7
8
9

Looking at your work-site

Checklists are useful tools for determining the presence of symptoms, hazards and risk factors of musculoskeletal disorders at your work-site. Checklists are a way of collecting the same kind of information each time you look at a site. They also serve as reminders to look at the most important activities related to musculoskeletal disorders on the site.

The following checklists are sample approaches to learning about hazards on your work-site, identifying solutions and how well your prevention program is working. These kinds of checklists can be changed to suit your worksite or your personal styles.

Worksite Evaluation Checklist

Why should I fill out the checklist?

This checklist is intended to help develop an "eye" for musculoskeletal problems and to prevent injuries.

Who fills out the checklist?

Jointly updated by contractors and workers or their representatives

How often do I update the checklist?

Every 2 weeks or as a site changes. Changes may include but are not limited to weather conditions, introduction of new workers on the site, new materials, change in operations, new phase of the project, etc.

Do I need to fill out the entire checklist?

Each time the checklist is updated fill out the **Job Site Information Section**. Some parts of the checklist may not apply to your kind of work. Fill out what applies to your job or site activities.

1
2
3 **Job Site Information**
4

5 Date: _____ Site: _____
6

7 General Contractor: _____
8

9 Subcontractor: _____
10

11 Worker/Representative: _____
12

13 Name / Signature: _____
14 (Person filling out this form)
15
16
17

Materials Handling & Lifting

List those tools and materials weighing over 20 lbs that are lifted by hand. These might include bricks or blocks, drywall, plywood, rebar, structural iron, roofing materials, forms, jack hammers, tampers, saws, pneumatic wrenches or anything over 20 lbs. Fill out the box

Tools/materials over 20 lbs	Jobs where lifting occurs	Job titles	Possible solutions to lifting

List the materials and tools weighing over 50 lbs that workers lift without assistance; how often do they perform these lifts each day. Fill in the box below.

Job title	Item being lifted over 50 lbs	# times/day	Possible Solution to eliminate lift

Are there handles for materials that must be carried? Yes____ No____

If there are no handles, why?

How can handles be easily installed?

If there are handles, are the handles easy to use and comfortable? Yes____ No____

Are workers encouraged to get someone's help to lift heavy materials?

Yes____

No____ Why not? _____

Are dollies, hand-trucks, wheelbarrows or other assists available for moving materials?

Yes_____

No_____ Why not? _____

If dollies, hand-trucks, wheelbarrows or other assists are available, are they being used?

Yes_____

No_____ Why not? _____

Are materials delivered as close as possible to where they will be used?

Yes_____

No_____ How can the delivery schedule be changed?

What jobs cause workers to lift overhead? Fill in the box.

Job title	Item being lifted	# times/day	Possible Solutions to reduce lift

Are materials stored on walking or working surfaces?

Yes_____ Do workers have to bend down to pick up or lift materials? Yes_____ No_____

No_____

Could the materials be stored at waist height?

Yes_____

No_____ Why not?_____

1 Which tasks do workers have to reach far to pick up or lift materials? Fill in the box.

Job title	Item being lifted	# times/day	Possible Solutions to reduce reach distances

2
3

Tools

Are tools kept sharp and in good condition?

Yes_____

No_____ Why not?_____

What can be done to improve tool maintenance?_____

What tools weigh more than 20 lbs? Fill in the box.

List tools more than 20 lbs	Who uses them	Alternative tools less than 20 lbs

What hand tools use on site vibrate? Fill in the box.

List hand tools that vibrate	Who uses them	Ways to reduce vibration exposure

What hand tools have to be used in awkward postures or in difficult positions? Fill in the box

List hand tools	Who uses them	Ways to reduce awkward postures

List the hand tools that have poor handle designs, grips that are too big or small, blow cold air on the workers' hands or have chilled handles. Fill in the table

List hand tools	Who uses them	Check the problems the tool has				Possible solutions
		bad design	grip size	cold air	chilled handles	

Repetitive Work

List the jobs that require motions be repeated many times for 1 hour or are repeated throughout the workday? Can the repetitions be reduced by job rotation or rest breaks? Fill in the box.

Job description	Job title of workers	Describe repeated motions	Repeated many times for 1 hour? (yes/no)	Repeated throughout the day? (yes/no)	Rest breaks possible? (yes/no)	Job rotation possible? (yes/no)

Awkward Postures

List the jobs that require work at shoulder height more than 1 hour per day; jobs that require overhead work more than 1 hour per day? Can scaffolds, platforms or other equipment reduce work above shoulder height?

Job description	Job title of workers	Work at shoulder height for 1 hour or more (yes/no)	Overhead work for 1 hour or more each day (yes/no)	Scaffolds, platforms, etc., possible (yes/no)	Other solutions?

Kneeling

List the jobs that require or kneeling for more than 1 hour a day? Are kneepads or cushions available? Are the pads or cushions being used? Fill in the box.

Job description	Job title of workers	Kneepads or cushions available (yes/no)	Kneepads or cushions used regularly (yes/no)	Equipment available to reduce kneeling?	Other solutions?

Working in one posture or position for a long period

List the jobs that require workers to stay in one position for a long time. Fill in the box.

Job description	Job title of workers	Possible solutions

Twisting, Turning, Bending

List the jobs that require a lot of twisting, turning or bending. Are there ways of reducing twisting, turning or bending? Fill in the box

Job description	Job title of workers	Check the motion the job requires				Possible solutions
		Twist	Turn	Bend	Combination	

Surfaces for Walking and Working

List the jobs where the working and walking surfaces are not clean and dry; obstructed; uneven

or not level. How can the surfaces be improved? Fill in the box.

Location of Working or Walking Surface	Condition of Work Surface Check all that apply					Ways to reduce or fix the condition
	Wet/ slippery	Obstructed	Uneven	Steep slope	Other condition(s) (list)	

Worksite Lighting Conditions

List the work areas that are lit with artificial lighting. Is there enough light to do the work? To see materials being moved? Are walking surfaces adequately illuminated? Do shadows restrict visibility? Does glare restricts visibility? Fill in the box.

Work Sites w/artificial lighting	Work Sites w/natural lighting	Enough light to do work (artificial or natural)	Walking surfaces well lit? (yes/no)	Shadows restrict visibility? (yes/no)	Glare restrict visibility? (yes/no)	Possible solutions

Standing

List the jobs that require workers to stand all day. Which jobs require standing on concrete or steel? Fill in the box.

Jobs requiring standing all day	Jobs standing on concrete or steel all day	Use anti-fatigue mats (yes/no)	Use job rotation (yes/no)	Use adjustable stools on work site? (yes/no)	Other solutions?

Sitting

List the jobs that require sitting for more than one continuous hour. Are workers sitting in the cold to do the job? Sitting on building materials to do the job? Fill in the box.

Job description	Job title of workers sitting	Sitting in cold to do job (yes/no)	Sitting on building materials or structure to do job (yes/no)	Possible solutions?

Heavy Equipment Operators

List the types of heavy equipment operating on the site. On which machines do operators need to lean forward to see or do their work? Do they have to stretch or use awkward postures to reach the equipment controls? Are the seats comfortable for the operators? Does the seating in

any of the equipment vibrate a lot? Are the mirrors in the right spots for good visibility? Fill in the box.

Equipment type on site	Number of pieces of each type	Need to lean forward to see? (yes/no)	Stretch or awkward postures to use controls? (yes/no)	Mirrors in the right places? (yes/no)	Good seats? (yes/no)	Seats vibrate? (yes/no)	Solutions to reduce the problem?

Training

List the training courses that superintendents had on preventing musculoskeletal disorders? What courses do they need to take? Fill in the box. If no courses were taken, write NONE on the first line.

	Name of courses taken & year taken	Name of courses needed
Name of Superintendents		

List the training courses that foremen had on preventing musculoskeletal disorders? What courses do they need to take? If no courses were taken, write NONE on the first line. Fill in the box.

	Name of courses taken	Name of courses needed
Name of Foremen		

List the training courses that foremen had on preventing musculoskeletal disorders? What courses do they need to take? If no courses were taken, write NONE on the first line. Fill in the box.

	Name of courses taken	Name of courses needed
Workers		

Recording Signs and Symptoms of Musculoskeletal Disorders

List the jobs and job titles of workers that have reported muscle pain, joint, back or neck pain in

the last 2 weeks. What is the possible cause of the symptom, for example, lifting, awkward postures, working in one position for long periods, repetitive work, something else? You might also want to look at OSHA 200 logs, first aid logs or any other sources of information that is available on your site. Fill in the box.

Symptom	Jobs	Job Title	Possible cause
Muscle pain			
Joint Pain			
Wrist or hand pain			
Elbow or shoulder pain			
Knee pain			
Ankle or hip pain			
Back Pain			
Neck Pain			

Reporting

Do workers feel free to report symptoms of musculoskeletal disorders, without fear of reprisal?	Yes	No
Do workers feel free to report hazards associated with musculoskeletal disorders?		
Does the company have an incentive program that discourages reporting of symptoms or injuries?		
Are hazards quickly remedied when reported?		
Do workers feel free to report suggested solutions?		
Do workers feel free to report injuries?		
Do foremen have the same freedom to report information about musculoskeletal disorders?		
Do superintendents have the same freedom to report information about musculoskeletal disorders?		

Solutions

Now that you have reviewed all of the jobs for hazards and risk factors related to musculoskeletal disorders, this is the time to consider solutions that best fit your worksite and budget, but which fix the problems.

Based on your review, list the jobs on site that are the most hazardous for musculoskeletal injuries?

- 1.
- 2.
- 3.
- 4.
- 5.

Work with the superintendents, foremen and workers to analyze the hazards you have noted as well as, risk factor information to select appropriate solutions. The analysis may be as simple as providing anti-fatigue mats for workers who stand on concrete all day, or as complex as developing a rotation schedule for workers who must work in cramped spaces all day.

List the suggested solutions according to the ease of getting done, the expense and the potential to eliminate the identified risk factor or hazard (effectiveness)?

Proposed solutions

Most effective - - - - - Easiest to get done- - - - - Least expensive

- 1.
- 2.
- 3.
- 4.
- 5.

Least effective - - - - - Hardest to implement - - - - - Most expensive

You also might want to develop a schedule that allows you to check back periodically to see if the solution actually worked.

Program Evaluation Checklist

Every health and safety program should have one part of its activities dedicated to the elimination of work-related musculoskeletal disorders. The most effective programs are evaluated on a regular schedule, especially as worksites change. This checklist provides a cursory evaluation of the main elements of your program to reduce musculoskeletal disorders. Fill this out to see where your program is working and where it might need improvement. If you answer No to any question, jot down why this activity does not occur in your organization.

Management Leadership and Employee Participation

	Yes	No	Reason for No	Possible solutions
Is there program participation by the site safety & health manager?				
Is there program participation by superintendents?				
Is there program participation by foremen?				
Are workers/representatives active throughout the program?				
Can participation be improved?				

Hazard Awareness and Identification

	Yes	No	Reason for No	Possible solutions
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Does the program ensure that superintendents, foremen and workers are able to identify symptoms, hazards, risk factors and abatements of musculoskeletal disorders?				
Does the program ensure superintendents, foremen and workers collect and report their information related to musculoskeletal disorders?				

Job Hazard Analysis and Hazard Control

	Yes	No	Reason for No	Possible solutions
Does the program ensure that MSD information is reviewed on a regular schedule?				
Does the program identify controls that are feasible for the worksite?				
Once identified, are the controls put into effect on the worksite?				

Training

	Yes	No	Why not?	Who is not trained?	Suggestions how to change

Are workers, foremen or superintendents trained about musculoskeletal disorders and the program?					
Has the training resulted in changed attitudes, work organization or behavior?					
Give examples of improvements due to last training					

Program Evaluation

	Yes	No	Why not?	Possible solutions
Does the program include a periodic evaluation?				
Does this evaluation drive program improvements?				
Is this evaluation share throughout the organization?				

1

Medical Management and Alternate Duty

	yes	no	why not	Possible Solutions
Does the program generally ensure prompt access to appropriate health care?				
Does the program ensure prompt access to appropriate health care for assessment of a condition?				
Does the program ensure prompt access to appropriate health care for treatment of a condition?				
Does the program ensure prompt access to appropriate health care for followup of a condition?				
Does the program provide medically appropriate alternate or reassigned duties?				

2
3
4
5
6
7

EXAMPLES OF ERGONOMIC SOLUTIONS IN CONSTRUCTION

PROBLEM	SOLUTIONS
Manual handling	Pre-job planning to minimize handling, improved housekeeping to prevent trips, increased use of carts/dollies/hoists/mechanical handling, ladder hoists/gin poles/daisy chains/cranes for moving materials on/off roofs, chain falls, motorized buggies, carrying handles, extension handles for carrying large or awkward materials (like drywall), Break up loads (cement in 47 lb bags), Shoulder pads for carrying on shoulders, Ergonomics training, Pre-job stretching program, weight labeling of materials, Getting help (two-person lifts)
Weight of building materials	Light-weight concrete blocks, fiberglass ladders, cement in smaller packages (47 lb), 3 ft wide drywall
Hand tools	Handles that are more comfortable, better grips, right size for the hand, allow a power grip for heavy work and pinch grip for fine work, allow a neutral wrist posture, reduce the amount of force needed, lighter weight tools when appropriate, power tools (cordless screwguns), tool sharpeners for cutting tools
Vibrating tools	Vibration absorbing padding on handles, anti-vibration gloves, vibration-dampened handles on pavement breakers
Whole-body Vibration	Vibration-dampened seating
Overhead work	Drywall lifts, scissors lifts, extension poles/stands for operating tools overhead, work platforms
Work at ground level	Tables/stands for bring work to waist height, storage of materials at waist height, adjustable height scaffolding for bricklayers, pipe stands for steam-fitters/plumbers, D handle/longer handles for shoveling, rebar tying devices, stand-up fastening systems for roof insulation
Awkward Postures- Operators	Better visibility for equipment operators, better cab design
Repetitive work	Power tools, micropauses/ rest breaks, job rotation
Kneeling	Knee pads, Pants with knee pad pockets, rest and stretch breaks
Standing on concrete	Shoe inserts, sit/stand stools, Bucket seat (converts a 5 gal bucket into a seat), floor mats, rest breaks